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Does Exchange Rate Policy Matter for Growth?

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The views expressed in this paper are those of the authors.
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Abstract

Previous studies on whether the nature of the exchange rate regime influences a country's medium-term growth performance have been based on a tripartite classification scheme that distinguishes between pegged, intermediate, and flexible exchange rate regimes. This classification scheme, however, leads to a situation where two of the categories (intermediate and flexible) characterize solely the exchange rate regime, whereas the third (pegged) characterizes *both* the exchange rate regime and the monetary policy framework. We believe that the failure to account for this discrepancy may result in an inaccurate assessment of the effects of alternative exchange rate regimes on economic growth. Our study refines this classification scheme by accounting for different monetary policy frameworks. We estimate the impact of exchange rate arrangements on growth in a panel-data set of 60 countries over the period from 1973 to 1998 using a dynamic generalized method of moments estimation technique. We find evidence that exchange rate regimes characterized by a monetary policy anchor, whether they are pegged, intermediate, or flexible, exert a positive influence on economic growth. We also find evidence that intermediate/flexible regimes without an anchor are detrimental for growth. Our results thus suggest that it is the presence of a strong monetary policy framework, rather than the type of exchange rate regime per se, that is important for economic growth. Furthermore, our work emphasizes the importance of considering the monetary policy framework that accompanies the exchange rate arrangement when assessing the macroeconomic performance of alternative exchange rate regimes.

JEL classification: F43, F33, F31, O40
Bank classification: Exchange rate regimes; Exchange rates; Monetary policy framework

Résumé

Les études précédentes sur les liens entre le type de régime de change et la croissance économique à moyen terme d'un pays s'appuyaient sur une typologie en trois volets, qui établissait une distinction entre régime de changes fixes, régime de changes flottants et régime intermédiaire. Cette typologie présente toutefois la particularité que deux des catégories (régime intermédiaire et changes flottants) caractérisent uniquement le régime de change, alors que la troisième (changes fixes) décrit *à la fois* le régime de change et le cadre de conduite de la politique monétaire. Selon Bailliu, Lafrance et Perrault, passer outre à cette particularité risque de fausser l'évaluation des effets qu'ont les différents régimes de change sur la croissance économique. C'est pourquoi les auteurs ont mis au point une typologie qui englobe différents cadres de politique monétaire. Ils

estiment l'incidence du régime de change sur la croissance d'après des données longitudinales relatives à 60 pays pour la période allant de 1973 à 1998, en recourant à une application dynamique de la méthode des moments généralisés. Ils constatent que les régimes de change assortis d'un point d'ancrage aux fins de la conduite de la politique monétaire, qu'il s'agisse de régimes de changes fixes ou flottants ou de régimes intermédiaires, exercent une influence positive sur la croissance. Par ailleurs, ils remarquent que les régimes de changes flottants ou les régimes intermédiaires dépourvus de point d'ancrage nuisent à la croissance. Les résultats de l'étude permettent donc de croire que la présence d'un cadre de politique monétaire solide, plutôt que le régime de change comme tel, est un facteur déterminant de l'expansion économique. En outre, l'étude fait ressortir combien il importe de considérer le cadre de politique monétaire qui accompagne le régime de change lorsque l'on évalue les effets de ce régime sur la tenue globale de l'économie.

Classification JEL : F43, F33, F31, O40
Classification de la Banque : Régimes de taux de change; Taux de change; Cadre de la politique monétaire

1. Introduction

The choice of exchange rate regime has been a subject of ongoing debate in international economics. This debate has been renewed in recent years as a result of a series of economic crises (in Mexico, Southeast Asia, Russia, and Brazil) in which unsustainable exchange rate regimes were widely perceived to have been a cause. As a result, the adequacy of exchange rate arrangements is one of the key issues being discussed by policy-makers at international meetings. One aspect of this debate is the notion that in a world of increasing international capital mobility, only polar regimes (i.e., hard pegs—such as currency boards and monetary unions—or pure floats) are likely to be sustainable.[1] This proposition, known as the hollowing-out hypothesis or the two-corners view, is gaining popularity. It is, however, not universally accepted. Indeed, some believe that intermediate regimes will continue to be a viable option, especially for emerging markets (for example, see Williamson 2000).

An important question in this debate is whether the nature of the exchange rate regime influences economic growth. From a theoretical perspective, both growth theory and the literature on exchange rate regimes suggest that the type of exchange rate regime adopted by a country could have consequences for its medium-term growth, both directly, through its effects on the adjustment to shocks, and indirectly, via its impact on other important determinants of growth, such as investment, international trade, and financial sector development. Economic theory, however, does not clearly identify which kind of exchange rate regime would be more likely to promote growth. Therefore, the question of whether a specific type of regime is more likely to foster economic growth is an empirical matter. This paper examines the cross-country experience with exchange rate policy in the post–Bretton Woods era in an attempt to shed some light on this question.

A small number of empirical studies have examined this issue in a cross-country context. Ghosh et al. (1997) found no systematic differences in growth rates across exchange rate regimes in a sample of 136 countries over the period from 1960 to 1989. The International Monetary Fund (IMF) (1997) confirmed this result when extending the period of analysis to the mid-1990s.[2] Several authors, including Calvo and Reinhart (2000) and Levy Yeyati and Sturzenegger (1999), noted that the failure to identify a relationship between the exchange rate regime and growth could be the result of measurement error in the classification of exchange rate arrangements.

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1. Fischer (2001), Eichengreen (1998), and Obstfeld and Rogoff (1995), among others, have made this point.
2. The latter study, however, did not control for other determinants of growth.

Indeed, these studies use the IMF's official exchange rate classification, which is based on self-classification by member countries and could thus differ from actual practice.

Two recent papers, which develop alternative classification schemes, do find evidence linking exchange rate regimes and growth. Bailliu, Lafrance, and Perrault (2001), in their study of 25 emerging-market economies over the period from 1973 to 1998, uncovered evidence that more flexible exchange rate arrangements are associated with higher economic growth, but only for countries that are relatively open to international capital flows and, to a lesser extent, that have well-developed financial markets. Similarly, Levy Yeyati and Sturzenegger (2001) found that less-flexible exchange rate regimes are associated with slower growth in developing countries; for industrialized countries, they found that the regime type has no significant impact on growth.

All of these studies base their characterization of the exchange rate regime on the degree of flexibility of the exchange rate that is inherent in the regime; the typical classification scheme used is tripartite and distinguishes between pegged, intermediate, and flexible exchange rate regimes. This classification scheme, however, leads to a situation where two of the categories (intermediate and flexible) characterize solely the exchange rate regime, whereas the third (pegged) characterizes *both* the exchange rate regime and the monetary policy framework.[3] We believe that the failure to account for this discrepancy may result in an inaccurate assessment of the effects of alternative exchange rate regimes on economic growth, because the intermediate and flexible categories may include both weak and strong monetary policy frameworks with differing implications for economic growth.[4]

Our study refines this classification scheme by accounting for different monetary policy frameworks, classifying monetary arrangements based on the presence of an explicit monetary policy anchor. By definition, all pegged exchange rate regimes have a nominal anchor (the exchange rate). In cases where the exchange rate regime is characterized as being either intermediate or flexible, we draw on work by Cottarelli and Giannini (1997) to determine whether monetary policy is characterized by the presence of a nominal anchor. To the best of our knowledge, our paper is the first in the literature to take this approach. In addition, we follow our earlier paper (Bailliu, Lafrance, and Perrault 2001) in that we use two different exchange rate classification schemes. In contrast to our previous study, we expand our sample to include industrialized as well as developing countries, and we use a dynamic generalized method of

3. We thank Nicholas Rowe for bringing this point to our attention.
4. The IMF has recognized the need to account for both the type of exchange rate regime and the monetary policy framework when classifying exchange rate regimes. This is reflected in their recent efforts to revise their exchange rate classification scheme (see IMF 1999).

moments (GMM) estimation technique to address econometric issues that arise in estimating growth regressions.[5]

Thus, we estimate the impact of exchange rate arrangements on growth in a panel-data set of 60 countries over the period from 1973 to 1998 using a cross-country growth framework that controls for other determinants of growth and accounts for country-specific effects.[6] Estimations are carried out using a dynamic GMM estimation technique that addresses two important econometric problems that arise in estimating cross-country growth regressions: potential endogeneity of the explanatory variables and correlation between the unobserved country-specific effects and the explanatory variables. We find evidence that exchange rate regimes characterized by a monetary policy anchor, whether they are pegged, intermediate, or flexible, exert a positive influence on economic growth. In addition, we find evidence that intermediate/flexible regimes without an anchor are detrimental for growth. Our results thus suggest that it is the presence of a strong monetary policy framework, rather than the type of exchange rate regime per se, that is important for economic growth. Furthermore, our work emphasizes the importance of considering the monetary policy framework that accompanies the exchange rate arrangement when assessing the macroeconomic performance of alternative exchange rate regimes.

Our paper is organized as follows. Section 2 presents the general framework that we adopt to explain a country's growth process; it forms the basis of our empirical investigation. In section 3, we describe our exchange rate classification schemes. The empirical methodology is described in section 4, and the estimation results are presented in section 5. Section 6 provides some concluding remarks.

2. Exchange Rate Arrangements: How Might They Influence Economic Growth?

In this section, we discuss how exchange rate arrangements can influence economic growth, drawing on growth theory and the literature on exchange rate regimes. First, we present the general framework that we adopt to explain a country's growth process, which we borrow from the empirical growth literature; this forms the basis for the empirical specification that we use in our subsequent econometric work. This growth framework, and the various theoretical models that underlie it, is explained in more detail in Barro and Sala-i-Martin (1995). Second, we explain the motivation behind the belief that a country's choice of exchange rate regime can have consequences for economic growth either directly through its effects on the adjustment to shocks,

5. In our earlier paper, we estimated the impact of the type of exchange rate regime on growth in a panel-data set of 25 emerging-market economies over the 1973–98 period using ordinary least squares with fixed effects, because there were too few observations to use the GMM estimation technique.
6. A list of the countries is provided in Appendix A.

and/or indirectly via its impact on other important determinants of growth, such as investment, international trade, capital flows, and financial sector development.

The workhorse of the contemporary empirical growth literature is a general framework that stipulates that a country's growth rate at time t is a function of both *state variables (SV)* and *control variables (CV)*:

$$GR_t = F(SV_t; CV_t). \quad (1)$$

This general specification is consistent with both neoclassical and endogenous-growth models. In a neoclassical framework, state variables account for the initial position of the economy, whereas control variables capture differences in steady-state levels across countries. In an endogenous-growth model, an economy is assumed to always be in its steady state, and therefore the explanatory variables capture differences in steady-state growth rates across countries. The specification can be used to explain either what determines differences in transitional growth rates across countries as they converge to their respective steady states (consistent with a neoclassical framework), or what determines differences in steady-state growth rates across countries (consistent with an endogenous-growth framework).

Using the growth relation in (1) as a basis for empirical work is appealing, because it has theoretical foundations and is broad enough to accommodate both major types of growth models; this specification is thus valid whether one assumes that the countries in the sample are in their steady states or not. The use of such a general specification, however, has a major drawback: translating such a framework into a specification that can be tested empirically is complicated by the fact that theory is not clear on which control variables are most important for growth. Indeed, although the choice of state variables to include is fairly uncontroversial,[7] growth theory does not provide a clear guide as to which control variables are most important in the growth process. As Barro and Sala-i-Martin (1995, 421) point out, "These variables would include preferences for saving and fertility, government policies with respect to spending and market distortions and so on."

Given the challenges in choosing a suitable set of explanatory variables to explain the growth process, we draw on the empirical growth literature to select an appropriate conditioning set (to ensure that we are controlling for other important determinants of growth) and motivate, using the literature on exchange rate regimes, our choice of the type of exchange rate regime as a determinant of growth.[8] The literature on exchange rate regimes suggests that the type of regime

7. Typically, both initial per-capita GDP and a proxy for human capital are included as state variables.
8. In addition, we check our results for robustness to changes in the conditioning set.

chosen could influence growth in two main ways: directly, through its effects on the adjustment to shocks, and indirectly, if it affects other control variables such as investment, trade, and financial sector development.

First, one can justify considering the exchange rate regime as a control variable in a growth regression because of its potential role in influencing growth through the extent to which a regime may assuage or amplify the impact and adjustment to economic shocks. The literature on exchange rate regimes has emphasized how an economy's adjustment process following a shock can differ based on the nature of the exchange rate regime. For instance, Mundell (1968) showed that even though the long-run equilibrium is the same in fixed and flexible regimes, the adjustment process towards the equilibrium will be different. Moreover, Broda (2002) found that responses to a negative terms-of-trade shock differed significantly across exchange rate regimes in a sample of 75 developing countries over the period 1973–96. In response to a negative terms-of-trade shock, he found that countries with fixed regimes experienced large and significant declines in real GDP, while the real exchange rate depreciated slowly by means of a fall in prices. Countries with more flexible regimes tended to experience small real GDP declines and large (and immediate) real depreciations.

It has been argued that a more flexible arrangement may foster higher growth, since it will enable an economy characterized by nominal rigidities to absorb and adapt to economic shocks more easily, because exchange rate movements can act as shock absorbers. A flexible exchange rate also allows a country to have an independent monetary policy, providing the economy with another means to accommodate domestic and foreign shocks. When the adjustment to shocks is smoother, one would expect growth to be higher, given that the economy is, on average, operating closer to capacity.

Indeed, the mitigation of business cycles has been shown to positively affect an economy's long-run growth rate. For instance, Barlevy (2001) develops a model where a dampening in cyclical fluctuations increases growth by increasing the average level of investment and by reducing its volatility. Moreover, Kneller and Young (2001) find a significant negative relationship between output variability and long-run output growth in a sample of 24 Organisation for Economic Co-operation and Development (OECD) countries over the period from 1961 to 1997. They find, however, that this relationship is conditional on the time dimension of the data.

A more flexible arrangement is also less likely to generate persistent misalignments in exchange markets, which may result in an economic crisis. Indeed, the literature on early-warning systems consistently finds that an overvalued real exchange rate is one of the most relevant advance indicators of an impending currency crisis (see Berg et al. 1999 and Goldstein, Kaminsky, and

Reinhart 2000). Thus, an important reason why pegged exchange rate regimes may be deleterious to growth is that they tend to break down.

The link between pegged regimes and currency crashes, however, is not clear. An IMF survey paper notes that of the 116 currency crashes (defined as a depreciation of at least 25 per cent and a 10 per cent increase in the rate of depreciation over the previous year) that took place between 1975 and 1996, close to half were under flexible regimes (IMF 1997, 91). However, this somewhat counterintuitive observation could also reflect the fact that many exchange rate regimes (particularly in developing countries) might have been improperly classified as flexible when they were, in fact, pegged regimes.

The 1990s witnessed many episodes where countries with fixed but adjustable exchange rate regimes were forced to abandon them because they had become unsustainable, and a costly crisis ensued. The subsequent negative impact of crises has been found to greatly exceed estimates of direct costs of misalignments under either regime, particularly when the currency crisis is associated with a banking crisis.[9] Countries suffering from frequent economic crises are likely to experience, on average, lower growth.

Some would contend, however, that a flexible regime is more prone to exchange rate shocks. Thus, they would argue, the introduction of this additional source of shocks to the economy under a more flexible regime might exacerbate the business cycle and dampen growth compared with a fixed exchange rate regime.[10] This problem could be especially pronounced for countries with underdeveloped or weak financial systems that might have problems accommodating large exchange rate movements under flexible regimes. And in terms of using an independent monetary policy to facilitate the adjustment to shocks, the point has been made that this argument is valid only for countries that possess monetary policy credibility. Indeed, for some countries, fixing the exchange rate to a hard currency might result in a smoother business cycle than if they attempted to conduct an independent monetary policy. For instance, Hausmann et al. (1999) argue that

9. By one estimate, for instance, the public sector bailout costs of resolving banking crises in developing countries over the 1980–95 period have amounted to around US$250 billion (Honohan 1997). In more than a dozen of these cases, the public sector resolution costs amounted to 10 per cent or more of the country's GDP and exceeded this level for the main countries affected by the Asian financial crisis (Goldstein, Kaminsky, and Reinhart 2000, 2). The costs of currency crises have also been significant. Goldstein, Kaminsky, and Reinhart (2000, 88) found that it can take between two and three years for economic growth to return to its pre-crisis average.

10. In general, an increase in nominal or real exchange rate risk need not be associated with an increase in uncertainty about macroeconomic conditions. For example, an increase in exchange rate variability associated with a shift to a more flexible exchange rate may be accompanied by a reduction in other kinds of risk in the form of lower inflation, interest rate variability, or output variability, particularly if it is accompanied by a monetary policy framework with a nominal anchor such as inflation targeting.

flexible exchange rate regimes in Latin America have not permitted a more stabilizing monetary policy, tending instead to be more pro-cyclical.

Second, exchange rate policy could affect economic growth indirectly through its influence on other determinants of economic growth, such as investment, openness to international trade and capital flows, and financial sector development. In the growth framework that we use, any effects of the exchange rate regime on growth that occur through these indirect channels would be captured by the coefficients on the respective explanatory variables and not by the coefficient on the exchange rate regime. Thus, we cannot isolate the effects of these variables on growth that are caused by the nature of the exchange rate regime from those that are caused by other factors; but we review these indirect effects in this section for completeness.

Exchange rate regimes can influence economic growth through their effects on the rate of physical capital accumulation. Some (e.g., Aizenman 1994) would argue that investment will tend to be higher under a fixed exchange rate regime as a result of a reduction in policy uncertainty, real interest rates, and exchange rate variability. On the other hand, by eliminating an important adjustment mechanism, fixed exchange rates can exacerbate protectionist pressures and reduce the efficiency of a given stock of capital, as well as result in misalignments that distort the efficient allocation of investment across sectors. Moreover, as Bohm and Funke (2001) argue, currency volatility—regardless of the nature of the exchange rate regime—may exert only a small influence upon the level of investment spending.[11] Thus, it is not surprising that the empirical literature on exchange rate regimes and investment has generated mixed results (e.g., Goldberg 1993, Huizinga 1994, Bordo and Schwartz 1999, and Lafrance and Tessier 2001).

The degree of openness of the economy to international markets is also believed to influence economic growth. The endogenous-growth literature has established a positive link between openness to international trade and economic growth, in line with the belief that countries that are more open to international trade will tend to grow more rapidly, because they have developed a greater ability to absorb technological advances and can take advantage of larger markets (Edwards 1993, Barro and Sala-i-Martin 1995). In addition, there may be positive spillovers to the non-tradable sector. Thus, to the extent that the nature of the exchange rate regime influences the volume of international trade, this could translate into an effect on growth.

11. Bohm and Funke (2001) develop an open-economy model based on the real-options literature where the effects of uncertainty on investment hinge on the sunk cost in capacity, the competitive structure of the economy, and the convexity of the profit function in prices. They conclude that exchange rate uncertainty plays a very modest role in the determination of investment spending.

The literature suggests that international trade is influenced by the type of exchange rate regime, but it does not clearly predict which regime is more likely to foster international trade. It has been suggested that trade should be higher under fixed regimes, since exchange rate volatility and uncertainty will be lower, which will tend to reduce the cost of trade and, hence, increase its volume.[12] While the notion that exchange rate volatility is detrimental to trade is intuitively appealing—because it can increase business risks and disturb planning—the effect on trade is not obvious once firms are allowed to diversify across markets, source inputs from both home and abroad, adopt flexible invoicing arrangements, or have access to hedging instruments. It is not surprising, therefore, that surveys of the empirical literature generally indicate either the absence of a link between measured exchange rate variability and the level of trade or, at best, mixed results (see, for instance, Côté 1994). On the other hand, there is some evidence suggesting that more flexible regimes can favour export growth, because, for example, they are less likely to create conditions for persistent misalignments (Nilsson and Nilsson 2000).

Although the link between international trade and growth has received more attention in the growth literature, openness to international capital flows can also be an important engine of growth. As emphasized by Bailliu (2000), international capital flows can promote growth by increasing the domestic investment rate, by leading to investments associated with positive spillovers, and/or by increasing domestic financial intermediation. Thus, similarly to international trade, the nature of the exchange rate regime can influence economic growth indirectly if it effects the volume or composition of international capital flows. It has been argued (e.g., Dooley 1994) that a fixed or quasi-fixed exchange rate regime, when coupled with regulatory distortions and/or prudential oversight, can be associated with an increase in speculative capital flows, as was the case with some of the capital flows to emerging markets in the 1990s. Capital flows occurring in this context are less likely to foster growth if they are channelled into unproductive investments. For example, Krugman (1998) and Corsetti, Pesenti, and Roubini (1998) develop models where foreign creditors believe they will be bailed out by the government and, hence, lend to local banks, which then channel these capital flows into largely unproductive investments. The banks have an incentive to engage in excessive risky lending because their liabilities are implicitly guaranteed by the government and they are poorly regulated.

Finally, the exchange rate regime could influence growth through its effects on the level of development of financial markets. Flexible arrangements are generally associated with increased nominal exchange rate volatility, which can have damaging effects on the real economy unless the financial sector can absorb exchange rate shocks and provide agents with appropriate hedging

12. Frankel and Rose (2002) found evidence that currency unions exert a positive effect on international trade, and hence on income per capita.

instruments. Thus, it is sometimes argued that an economy must have a reasonably well-developed domestic financial system to benefit from a flexible exchange rate regime.[13] Many emerging-market economies have shallow capital markets, and hence may find it difficult to manage a flexible exchange rate regime. Indeed, some (e.g., Aizenman and Hausmann 2000) argue that, because of the state of their financial markets, the gains from fixing the exchange rate may be greater for emerging-market economies than for industrialized countries. However, the combination of an underdeveloped financial sector and a fixed exchange rate regime can also be problematic, because it can result in a banking crisis. As Chang and Velasco (2000) argue, a hard peg may make balance-of-payments crises less likely only by making banking crises more likely.

Although having a mature financial sector is often considered a necessary condition to float, a sound and well-developed financial sector is important for economic growth, regardless of the type of exchange rate regime. A large body of work, reviewed by Levine (1997), has shown how the existing level of development of the financial system—reflected in its ability to exercise functions such as mobilizing savings, helping to allocate capital, and facilitating risk management—can promote growth through its effects on capital accumulation.[14] In addition, empirical evidence supports the view that a well-functioning financial system contributes to economic growth (Goldsmith 1969, and Levine, Loayza, and Beck 2000).[15]

Most of the discussion thus far has focused on fixed versus flexible exchange rate regimes because that is how exchange rate regimes are characterized in much of the literature. However, a large number of exchange rate regime options between those extremes are available to countries; they are often called intermediate regimes. As stated earlier, a popular view is that intermediate regimes are becoming unsustainable in a world of increasing capital mobility. This argument is based on the fact that intermediate exchange rate regimes are deemed to lack credibility and hence are more susceptible to speculative currency attacks. For instance, Frankel et al. (2001) claim that intermediate exchange rate regimes tend to be harder for international investors to monitor than hard pegs or pure floats. Others, such as Eichengreen (2000) and Glick (2000), argue that intermediate exchange rate arrangements make economies more fundamentally vulnerable to

13. Bordo and Flandreau (2001) find evidence for the post–Bretton Woods period that suggests that countries with more developed financial systems tend to have floating exchange rate regimes.
14. A more developed financial system can promote growth by increasing the efficiency with which savings are allocated to investment and/or by improving the allocation of capital.
15. Causality in this case is not unidirectional, however. Economic activity and technological innovation affect the structure and quality of financial systems. Moreover, as Levine (1997) points out, other factors, such as a country's legal system and political institutions, drive both financial and economic development at critical junctures in the growth process.

economic crises, because they provide insufficient incentives for both policy-makers and private agents to undertake actions that would make the economy more resilient to economic shocks.

Others, however, believe that intermediate regimes will continue to be a viable option, especially for emerging markets (e.g., Williamson 2000). Proponents of this view believe that intermediate regimes can be a useful option for countries that want to trade off credibility and flexibility in their choice of exchange rate regime, or countries in transition to a monetary union or a floating regime. It is important to remember, however, that not all intermediate regimes are created equal, and it is thus important to differentiate between credible intermediate regimes and those that lack credibility. This reinforces the need to control for the type of monetary policy framework when classifying exchange rate regimes.

3. Classification of Exchange Rate Regimes and Monetary Policy Arrangements

Given the well-acknowledged measurement problems in the official classification and the difficulties in identifying the "true" classification scheme by other means, our approach in this paper is to use two different classification schemes that we view as complementary. Exchange rate regimes are thus categorized based on the official classification and on a method we develop that we believe better reflects, on average, the degree of exchange rate flexibility in our sample. The first scheme is sometimes called the *de jure* classification because it is based on what countries report to the IMF, whereas the second can be thought of as a *de facto* classification because it is based on the observed behaviour of the exchange rate. In both cases, we augment the exchange rate classification with information on the objectives of monetary policy for intermediate and floating regimes, namely the presence of a nominal anchor. By doing so, we address a deficiency in previous work in which pegged exchange rate regimes defined both the exchange rate regime and the monetary arrangement, whereas the intermediate and flexible classifications characterized solely the exchange rate regime.

The IMF's official exchange rate classification, published annually in its *Annual Report on Exchange Arrangements and Exchange Restrictions* (IMF 1960–98), is based on self-identification by member countries. Ghosh et al. (1997) use the IMF's data to develop a tripartite classification scheme for 136 countries over the period from 1960 to 1990. They do this by aggregating the nine-regime classification scheme reported by the IMF into a tripartite classification, where exchange rate regimes are classified as being either pegged, intermediate, or flexible. We adopt Ghosh et al.'s tripartite scheme as our official classification and extend their data set through to 1998 using the IMF's aforementioned annual publications.

As stated earlier, no effort is made to ensure that what is reported to the IMF is consistent with actual practice, and therefore the official classification suffers from important measurement problems. Several studies have documented this problem and have attempted to develop measures of exchange rate flexibility that more accurately reflect actual practice. These studies focus on the relationship between exchange rate regimes and the volatility of the exchange rate and international reserves. In theory, more flexible arrangements should exhibit greater nominal exchange rate volatility and lower international reserve volatility in response to external shocks than would more rigid arrangements. Using cluster analysis, Levy Yeyati and Sturzenegger (1999) find that 26 per cent of the countries examined follow an exchange rate arrangement that is different from their *de jure* regime, the majority of which are concentrated in emerging markets. Calvo and Reinhart (2000), using more traditional economic analysis and accounting for movements in commodity prices, arrive at a similar conclusion. Glick and Wihlborg (1997) develop a measure of exchange rate flexibility based on changes in reserves and nominal exchange rates, whereas Hausmann, Panizza, and Stein (2001) use the ratio of the standard deviation of nominal depreciations to the standard deviation of reserves over M2 to assess the extent to which countries engage in intervention to control their exchange rates. However, of the studies, only Levy Yeyati and Sturzenegger (1999) actually reclassify exchange rate regimes using the method they propose.

Using exchange rate and international reserve volatility as conditioning information for a *de facto* classification of exchange rate arrangements is a promising avenue. There are, however, two main drawbacks to such an approach. First, as noted by Hausmann, Panizza, and Stein (2001), external shocks can lead to errors in interpreting the true nature of the regime. Large shocks might lead to sharp revaluations of pegged currencies, while floating currencies experiencing limited external shocks might exhibit little volatility. Second, it is not apparent how one can control (apart from direct observation) for the higher volatility that is associated with fixed regimes undergoing revaluations.

To deal with these issues, we develop a two-step hybrid mechanical rule (HMR) that classifies exchange rate regimes in terms of their observed flexibility and takes into account external shocks and revaluations. Our identification procedure is based on observed nominal exchange rate volatility, as well as on the official classification; we measure exchange rate volatility by the standard deviation of monthly percentage changes in nominal U.S.-dollar exchange rates over a given year. In the first step, we classify countries as having a pegged regime based on the *de jure* classification, since the literature has identified a bias for declaring exchange rate arrangements as being more flexible than they actually are and not vice-versa.[16] This rule reduces the probability

16. This bias is thought to result from the fact that it is difficult for a country that publicly says it is pegging its exchange rate to cheat on the exchange rate commitment, given the fixity of the nominal target.

of identifying currency revaluations in pegged regimes (which induce significant exchange rate volatility) as representing flexible arrangements. We also classify as pegged all regimes in which exchange rate volatility is less than 0.45 percentage points over a given year. This threshold, while arbitrary, is broadly consistent with the IMF's official classification: most *de jure* fixed arrangements in our sample exhibit exchange rate volatility of less than 0.45 percentage points.

In contrast to the approach of Levy Yeyati and Sturzenegger (1999) and that of Calvo and Reinhart (2000), our method identifies intermediate and flexible regimes based entirely on observed exchange rate volatility, and does not account for the variability of international reserves. To control for external shocks, which we assume are principally terms-of-trade or capital-account shocks, we group the countries in our sample into one group for industrialized countries and several groups for emerging markets based on regional geographic location.[17] The rationale for this is to create groups in which countries are most likely to be influenced by common shocks.

For the case of terms-of-trade shocks, this implies assuming a broad conformity of trade patterns within each group. While acknowledging that there might be a potential problem with certain commodity producers (e.g., some countries in Latin America are net exporters of oil, whereas others are net importers), we believe that this is a reasonable assumption, since the countries in the identified groups share common characteristics and may often be subject to common shocks. For the case of shocks to the capital account this implies assuming that financial disturbances are common to the group. There is some evidence for this. For instance, the empirical literature on contagion and crisis prediction models often finds significant explanatory power with regional crisis dummies; i.e., the odds of a currency crisis are increased if a neighbouring country has recently undergone such an event (Glick and Rose 1999, and Kruger, Osakwe, and Page 2000).

We then develop an exchange rate flexibility index for each country based on its degree of exchange rate volatility relative to the group average for each year of our sample period. Countries whose flexibility index is greater than one are considered to be flexible; the others fall into the intermediate category. Table 1 shows how the various types of exchange rate regimes are categorized according to both the official and HMR classification schemes.

17. Appendix B lists our sample countries according to their country grouping. The group average for the Middle East was calculated using five additional countries (Bahrain, Iran, Jordan, Kuwait, and Syria) and that for Eastern Europe was calculated using three additional countries (Hungary, Poland, and Romania). These countries were subsequently dropped from the sample because they had too many missing observations for the other explanatory variables.

Table 1: Types of Exchange Rate Regime in each Category by Classification Scheme

ER regime category	Official	HMR
Pegged	Currency boards Single-currency pegs Basket pegs	Currency boards Single-currency pegs Basket pegs Crawling pegs with narrow bands
Intermediate	Crawling pegs Target zones	Flexibility index < 1
Flexible	Floats with some intervention (but no predetermined range for intervention) Pure floats	Flexibility index > 1

Although we believe that the HMR classification scheme better reflects, on average, the degree of exchange rate flexibility inherent in the regime, we acknowledge that it is not a perfect identification scheme. For instance, it does not allow us to reclassify pegged exchange rate regimes as more flexible arrangements. Thus, if a country declares itself as following a pegged exchange rate regime but revalues its exchange rate several times a year, under the HMR it would be classified as a pegged exchange rate regime. Also, by construction, the HMR will always classify some regimes as intermediate and some as flexible in a given country grouping. Thus, the HMR might overestimate (underestimate) the number of intermediate regimes relative to flexible if the average exchange rate volatility in a given group is higher (lower) than its median exchange rate volatility.[18]

Charts in Appendix E depict the evolution of exchange rate regimes in our sample of 60 countries over the period from 1973 to 1998 using both classification schemes. As shown in the top chart, the official classification shows a distinct trend over time away from pegged exchange rate and towards flexible exchange rate regimes. In fact, the official classification suggests that flexible exchange rates are now the most popular exchange rate regime. The popularity of intermediate regimes appears to fluctuate over time, with no discernible trend evident from the chart. The bottom chart, which shows the distribution of regimes across type according to the HMR classification, tells a slightly different story. In line with the recent literature on *de facto* exchange rate arrangements, the HMR identifies a discernible trend towards intermediate exchange rate

18. We did not find large differences between average and median exchange rate volatilities for the different country groupings in our sample, and thus do not feel that this issue is a big concern.

regimes and no generalized move towards flexible exchange rate regimes.[19] Furthermore, the chart suggests that while there has been a notable decline in the number of countries opting for pegged exchange rate regimes, they remain popular. Neither one of these charts shows any evidence of a "hollowing-out of the middle" in more recent years, as Fischer (2001) has found. Given that our exchange rate regime categories and those used by Fischer are different, it is not surprising that we arrive at different conclusions regarding recent trends in exchange rate regimes. More specifically, our pegged category is broader than the fixed category used by Fischer, which includes only hard pegs such as currency boards, monetary union, or dollarization. As stated earlier, we include single-currency and basket pegs in our definition of a pegged exchange rate regime.

As Appendix E shows, there are discrepancies between the classification schemes. These differences are also evident in Table 2, which shows the number of annual observations in each category by country grouping and according to both classifications. The last column gives the number of observations that were reclassified into the given category when going from the official classification to the HMR scheme. As shown, a significant number of the emerging-market countries in our sample identifying themselves as floaters are found to follow more rigid arrangements under the HMR. Moreover, our sample—according to both classification schemes—is lopsided towards pegged exchange rate regimes, given that this type of regime, notwithstanding more recent trends, was the most popular regime throughout the sample period. Indeed, pegged regimes account for roughly half of the observations throughout the sample period.

19. This result is in line with Masson's (2000) finding that an intermediate exchange rate regime is not a "vanishing" state. He concludes that the intermediate cases are likely to continue to constitute a sizable portion of actual exchange rate regimes.

Table 2: Number of Annual Observations in each Exchange Rate Regime Category by Country Grouping and by Classification Scheme (60-country sample over 1973–98)

ER regime classification	Official	HMR	Reclassifications
	(# of annual observations)		(# of annual obs.)
All countries			
Pegged	748	887	139
Intermediate	356	396	40
Flexible	442	267	175
Emerging market countries			
Pegged	635	772	137
Intermediate	179	183	4
Flexible	257	120	137
Industrialized countries			
Pegged	113	115	3
Intermediate	177	213	36
Flexible	185	147	38
Latin America			
Pegged	180	240	60
Intermediate	112	89	23
Flexible	82	46	36
Middle East			
Pegged	86	93	7
Intermediate	20	5	15
Flexible	10	23	13
Asia			
Pegged	123	185	62
Intermediate	37	37	0
Flexible	88	28	60
Africa			
Pegged	246	254	8
Intermediate	10	52	42
Flexible	68	19	49

From a regional perspective, we find that there is a greater discrepancy between *de jure* exchange rate regimes and our *de facto* classification in Asia and Africa. In Korea, for instance, we find that, since 1980, the regime appears to be less flexible than officially stated. Another example is Indonesia, which, as of 1987, had an exchange rate regime classified by the HMR as a pegged

arrangement, even though the regime was officially classified as flexible. There is less systematic divergence between the HMR and the official classification in Latin America. Nonetheless, discrepancies between the classification schemes do exist. Note, for instance, that the HMR finds a significantly more rigid exchange rate regime for Mexico in the period leading up to the peso crisis in December 1994 than the official classification would indicate. The same holds true for Brazil in the period leading up to the flotation of the *real* in January 1999.

The HMR classification, when applied to industrialized countries, generates results that are in many ways compatible with those of Calvo and Reinhart (2000), who find that many industrialized countries follow exchange rate policies that are substantially less flexible than officially stated. In our opinion, misclassification of exchange rate regimes is a problem mainly in emerging-market countries, notwithstanding the findings of Calvo and Reinhart (2000). In this respect, applying the HMR to the industrialized countries in our sample may be an attempt to remedy a problem that does not exist. For conformity's sake, however, all countries in our sample were treated equally and the HMR was applied to all of them.

We supplement the exchange rate classification with information on the monetary policy framework in our sample countries. As Laidler (1999) pointed out, a pegged exchange rate regime represents a coherent monetary order, since the exchange rate is the target of monetary policy. Intermediate and flexible exchange rate regimes are not so characterized. Rather, they simply define the exchange rate arrangement, and preclude any conclusion about the framework in which monetary policy is conducted (other than to confirm that the central bank is not using the exchange rate as a nominal anchor). An empirical analysis comparing pegged exchange rates with these other regimes risks being biased by this fact.

As a consequence, we draw on IMF data on the objectives of monetary policy in our sample of countries to augment our exchange rate classifications. Cottarelli and Giannini (1997) identify the monetary policy framework in a number of countries over the 1970 to 1994 period. Subsequently, this information is reported in the *International Financial Statistics* (IFS). Both these publications report the presence of a *publicly announced* nominal anchor in the monetary policy formulation process. According to our classification, a publicly announced nominal anchor could take one of three forms: exchange rate anchor, monetary target, or inflation target. Based on this information, we expand the tripartite classification scheme to one that includes five categories: pegged, intermediate with a nominal anchor, intermediate without a nominal anchor, flexible with a nominal anchor, and flexible without a nominal anchor. We construct these five categories for both

the official classification and the HMR.[20] Appendix D shows how each country in our sample was categorized over time in terms of both the three- and five-category classification, and, in each case, for both the official and HMR classification schemes.

4. Empirical Methodology

This section describes the econometric specification used in estimating our cross-country growth equation, discusses the expected signs on the explanatory variable coefficients, and outlines the estimation method employed. As discussed in section 2, we borrow our general specification from the empirical growth literature. Estimations are carried out using a dynamic GMM estimation technique, which addresses two important econometric problems that arise in estimating cross-country growth regressions: endogeneity of the explanatory variables and correlation between the unobserved country-specific effects and the explanatory variables.

The general framework outlined in equation (1), which stipulates that a country's growth rate at time t is a function of its state and control variables, forms the basis for the following econometric specification:

$$GR_{i,t} = \alpha_i + \eta_t + V_{i,t}\beta + X_{i,t}\delta + \varepsilon_{i,t}, \qquad (2)$$

where $GR_{i,t}$ is the growth rate of real per-capita GDP in country i and period t, α_i is a country-specific effect, η_t is a time dummy, $V_{i,t}$ is a row vector of growth determinants measured at the beginning of period t, $X_{i,t}$ is a row vector of growth determinants measured as averages over period t, and $\varepsilon_{i,t}$ is an error term. Five-year periods are used, which is typical in the literature, since that interval is thought to be long enough to eliminate business cycle effects but short enough to capture important changes that occur over time for a particular country.

The country-specific effect, α_i, is designed to capture the determinants of a country's growth rate that are not already controlled for by the other explanatory variables. It thus accounts for unobservable characteristics that vary across countries but not over time. The country-specific effect could be either a *fixed* effect (i.e., a constant that varies for each cross-sectional unit), or a *random* effect (i.e., a random variable drawn from a common distribution with mean α and variance σ_α^2). As is discussed in more detail below, the methodology employed in this paper

20. Whereas this approach focuses on the *intentions* of the monetary authorities, we also considered another method that emphasizes monetary policy *outcomes*. In the latter case, we interacted the exchange rate regime dummies with inflation to determine whether the effect of the type of exchange rate regime on growth was influenced by the level of inflation in the economy. We found no such evidence.

makes it possible to estimate the coefficients of interest without having to restrict the country-specific effects to being either fixed or random. The time dummy, η_t, is intended to capture the effects of global shocks—such as the oil shocks of the 1970s or the debt crisis of the 1980s—on economic growth.

In addition to accounting for country-specific effects and the presence of global shocks, we also control for other determinants of the growth rate to ensure that the estimated coefficients on the exchange rate regime variables capture the effects of the exchange rate regime on growth and not the influence of some other variable(s). The literature guided us in selecting appropriate explanatory variables.[21]

Two of the variables are measured at the beginning of each period, and they represent initial conditions or state variables in a neoclassical growth model. The first is per-capita income (in natural log form). According to neoclassical theory, the coefficient on per-capita income represents the convergence effect and should be negative.[22] In endogenous-growth models, there is no convergence effect, since economies do not depart from their steady states, and therefore the coefficient is expected to be zero. The second variable is a measure of the stock of human capital. Growth theory, whether neoclassical or endogenous, predicts that the coefficient on the stock of human capital should be positive, since countries that have more human capital will tend to have higher growth rates.

The other explanatory variables are measured as averages over each five-year period. They include the real investment rate, the real share of government consumption, measures of openness to both international trade and international capital flows, a measure of financial sector development, and variables to account for the nature of the exchange rate regime and the presence of a monetary policy anchor. The government consumption variable is intended to capture public expenditures that do not directly affect productivity but could distort private sector decisions. The coefficient on that variable is thus expected to be negative. On the other hand, the effects of investment, international trade, international capital flows, and financial sector development on growth are all expected to be positive, as discussed in section 2.

For our exchange rate variables, we use both the traditional tripartite classification scheme (pegged, intermediate, and flexible) and our expanded classification that distinguishes between intermediate/floating regimes based on the presence of a nominal monetary policy anchor. In each

21. Appendix C lists sources and describes the variables used in the analysis. Appendix F provides descriptive statistics.

22. If convergence holds, the economy of a country will grow faster with a relatively lower level of initial per-capita GDP, since it is that much further away from its steady state and must catch up.

case, the exchange rate regime is classified according to both the official classification and the HMR scheme. To capture the type of exchange rate regime, we use a series of dummy variables. Since we are using five-year periods, this variable captures the average or typical regime during this interval. In cases where the classification changed during the five-year period, the typical regime is the one that occurred most of the time (i.e., at least three out of five years).

To provide a consistent estimation of equation (2), we use a panel-data GMM estimation technique, developed by Holtz-Eakin, Newey, and Rosen (1990) and Arellano and Bond (1991), and applied to cross-country growth regressions by Caselli, Esquivel, and Lefort (1996) and Levine, Loayza, and Beck (2000). This technique makes it possible to address two important econometric problems that arise in estimating cross-country growth regressions. First, some of the explanatory variables in a cross-country growth regression are likely to be endogenous and, if this is the case, then an estimation using ordinary least squares (OLS) would yield biased and inconsistent estimates.[23] Second, even if an instrumental-variables (IV) estimation technique is used to account for the endogeneity of some of the regressors, the estimates would still be inconsistent, given that the country-specific effect is correlated with at least one of the explanatory variables. Indeed, the country-specific effect in equation (2) is correlated with initial real per-capita GDP, one of the variables in the vector $V_{i,t}$. This becomes clear when (2) is first rewritten as follows:

$$y_{i,t} - y_{i,t-\tau} = \alpha_i + \eta_t + \lambda y_{i,t-\tau} + V_{i,t-\tau}\beta + X_{i,t-\tau}\delta + \varepsilon_{i,t}, \tag{3}$$

where $y_{i,t}$ is the natural log of real per-capita GDP in country i and time period t and the time subscripts are modified so that $V_{i,t-\tau}$ is a row vector of growth determinants measured at the beginning of the $(t-\tau, t)$ period, $X_{i,t-\tau}$ is a row vector of growth determinants measured as averages over the $(t-\tau, t-1)$ period, and $\tau = 5$. Next, (3) is rewritten as a dynamic model in the level of real per-capita GDP, as follows:

$$y_{i,t} = \alpha_i + \eta_t + \gamma y_{i,t-\tau} + V_{i,t-\tau}\beta + X_{i,t-\tau}\delta + \varepsilon_{i,t}, \tag{4}$$

where $\gamma = 1 + \lambda$. Thus, by construction, the lagged dependent variable in equation (4) is correlated with the country-specific effect (i.e., $E(\alpha_i y_{i,t-\tau}) \neq 0$). An IV estimation procedure would yield inconsistent estimates whether the country-specific effects are assumed to be random or fixed.[24]

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23. For instance, as discussed in section 2, there might be a two-way causality between the level of financial market development in an economy and its growth rate.

24. Nickell (1981) showed that the standard within-group estimator for dynamic models with fixed effects generates estimates that are inconsistent when the number of periods in the panel is small relative to the number of cross-sectional units.

The GMM estimation technique employed in this paper addresses both of these issues. This methodology involves first rewriting the growth regression expressed in equation (3) as a dynamic model in the level of real per-capita GDP, as was done in equation (4). Ignoring the time dummies for the moment, equation (4) is then first-differenced to eliminate the country-specific effects:

$$y_{i,t} - y_{i,t-\tau} = \gamma(y_{i,t-\tau} - y_{i,t-2\tau}) + (V_{i,t-\tau} - V_{i,t-2\tau})\beta + (X_{i,t-\tau} - X_{i,t-2\tau})\delta + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \quad (5)$$

Next, three assumptions are made that imply a set of moment restrictions that can be used in the context of a GMM estimation and, hence, generate consistent estimates of the parameters in the growth equation. The first assumption is that the error term is serially uncorrelated. This implies that there is no τ-order serial correlation. The second assumption is that the variables representing initial conditions are predetermined; those variables measured at the beginning of the $(t-\tau, t)$ period are considered to be predetermined for time t and beyond. The third assumption is that the control variables are weakly exogenous. In other words, those variables measured as averages over the $(t-\tau, t-1)$ period are considered to be predetermined for time $t+\tau$ and beyond.

Given the set of identifying conditions made, the lagged values of the explanatory variables can be used as instruments in the estimation of equation (5). In that equation, the state variables lagged one period and the control variables lagged two periods will be valid instruments. For instance, when estimating the growth rate from 1978 to 1983 on initial conditions for 1978 and the other explanatory variables averaged from 1978 to 1982, the initial conditions for 1973 would be valid instruments. Moving up one period, when estimating the growth rate from 1983 to 1988 on initial conditions for 1983 and the other explanatory variables averaged from 1983 to 1987, the initial conditions for 1973 and 1978 and the other explanatory variables averaged from 1973 to 1977 would be valid instruments.

Given that the consistency of the GMM estimates depends on the soundness of the instruments, two specification tests are employed to test the validity of the instruments.[25] The Sargan test is used to verify independence between the instruments and the error term. The null hypothesis in this case is that the instruments and the error term are independent. The Difference-Sargan test is used to verify that the error term is not serially correlated, as assumed. Under the null hypothesis, there is no τ–order serial correlation. Thus, a failure to reject the null for both tests would be evidence in support of the fact that the instruments are indeed valid. Both the Sargan and Difference-Sargan tests are distributed as chi-square under the null hypothesis.

25. For more information on these specification tests, see Arellano and Bond (1991).

Equation (5) was estimated on our sample of 60 countries with data from 1973 to 1998 set up in five-year periods. The countries, listed in Appendix A, were selected based on data availability. Not all data series are complete for all countries; in other words, the panel-data set is unbalanced. The GMM procedure outlined in this section can accommodate unbalanced panels, thus enabling the use of a larger number of observations than if there had been a requirement for the panel to be balanced.

5. Estimation Results

Tables G.1 through G.3 in Appendix G show the results of the GMM estimation of equation (5) under various specifications. The tables show the estimation results for both the official and the HMR exchange rate classification schemes. In Table G.1, the results are displayed using both the traditional tripartite classification scheme (i.e., pegged, intermediate, and flexible) and our expanded classification that distinguishes between intermediate/floating regimes based on the presence of a nominal monetary policy anchor. In Table G.2, we show the results of regrouping the intermediate and flexible regimes for each of the anchor/no-anchor groupings. Finally, Table G.3 shows results for the monetary policy anchor variable without any of the exchange rate regime variables. All estimation results were checked for robustness to specification changes.[26]

The results of the two specification tests suggest that the instruments used are valid. Indeed, the reported *p*-values for the Sargan and Difference-Sargan tests show a failure to reject the null hypotheses in both cases across all the estimations. As outlined in Table 3, the signs of the coefficients on the explanatory variables other than the exchange rate regime variables are generally statistically significant and consistent with our priors. The coefficients on initial real per-capita GDP and the government's share of real GDP are negative, whereas the coefficients on the proxy for human capital and the measures of international openness are positive. The coefficients on investment and financial sector development, however, are not statistically significant.

It may seem somewhat surprising that the coefficient on the investment rate is not statistically significant, given that many empirical studies find the relationship between the investment rate and growth in cross-country regressions to be quite robust. As Easterly (2001) points out, however, the traditional presumption that higher investment ratios translate into faster growth is not borne out in the data. Indeed, looking at the data (averaged over four-year periods) for 138 countries over the 1965–95 period, Easterly finds that during episodes of increased growth, investment increased only 6 per cent of the time. He concludes that, empirically, increases in investment are neither necessary nor sufficient for increases in growth over the short to the medium run.

26. In terms of changes to the specification, we added variables such as inflation and population growth, and tried different measures of financial sector development.

Table 3: Summary of Cross-Country Growth Regression Results

Dependent variable: growth rate of real per-capita GDP

Explanatory variable	Sign of coefficient	Statistically significant?	Robust to specification changes?	Robust across ERR classifications?
Initial real per-capita GDP	–	yes	yes	yes
Average years of schooling	+	yes	yes	yes
Investment/GDP		no		
Gov't consumption/GDP	–	yes	yes	yes
Trade/GDP	+	yes	yes	yes
Private credit/GDP		no		
Gross capital flows/GDP	+	yes	yes	yes
Flexible exchange rate regime	–	yes	yes	no
Intermediate exchange rate regime	–	yes	yes	no
Pegged exchange rate regime	+	yes	yes	somewhat
Flexible regime with anchor		no		
Flexible regime without anchor		no		
Intermediate regime with anchor		no		
Intermediate regime without anchor	–	yes	yes	no
Flex. and int. regime with anchor	+	yes	yes	somewhat
Flex. and int. regime without anchor	–	yes	yes	somewhat
Monetary policy anchor	+	yes	yes	yes

We first consider the estimation results of the specifications that include both the traditional tripartite classification (pegged, intermediate, and flexible) and our expanded classification that distinguishes between intermediate/floating regimes based on the presence of a nominal monetary policy anchor. These results are shown in Table G.1. The first three columns of Table G.1 display the estimation results for the tripartite classification. For the official classification, the coefficients on the exchange rate dummy variables are not statistically significant, regardless of which type of exchange rate regime is selected as the omitted category. We report only the results using pegged as the omitted category, which are displayed in the first column of Table G.1. For the HMR classification, however, the coefficients on the exchange rate regime variables are statistically significant. As shown in the second and third columns, the coefficients on both the intermediate and flexible regime dummies are negative, whereas the coefficient on the pegged exchange rate regime dummy is positive; in all three cases, the coefficients are robust to specification changes.

The estimations yield different results when we use our expanded categorization that distinguishes between different monetary policy frameworks for intermediate and floating regimes. For the official classification, the coefficients on the exchange rate regime variables continue to be statistically insignificant.[27] For the HMR classification, we find evidence to suggest that not all intermediate regimes exert a negative influence on growth, but only those that do not have a nominal monetary policy anchor. Indeed, as shown in the last two columns of Table G.1, the coefficient on the intermediate regime with no anchor is negative, statistically significant, and robust to specification changes. The coefficient on the intermediate regime with an anchor, however, is not statistically significant. Moreover, the negative effect of the floating exchange rate regime disappears. Our result for the pegged regime continues to hold.

These results suggest that a pegged exchange rate regime is positively linked to growth, an intermediate regime without an anchor is negatively related to growth, and all other types of regimes have no discernible effect of the type of exchange rate arrangement on economic growth. These results, however, are not robust to exchange rate classification schemes, given that they hold only for the HMR and not for the official classification.

Our results may be influenced by the distribution of observations across the various exchange rate regimes in our sample. Indeed, as stated in section 3, our sample is lopsided towards pegged exchange rate regimes, given that they account for roughly half of the observations throughout the sample period regardless of the classification scheme used. This skewed distribution is even more obvious when we use the five-category classification, because roughly half of the observations are

27. Again, we report only the results using pegged as the omitted category, although the results were statistically insignificant regardless of which regime was used as the omitted category.

split between four categories. This may help to explain why we are not getting any statistically significant results for three of the five categories.

To address the issue of too few observations in the intermediate and flexible categories in the five-category classification, we re-estimated the regressions in Table G.1 by regrouping the intermediate and flexible regimes for each of the anchor/no-anchor groupings. This enables us to differentiate between a pegged exchange rate regime and a "more flexible" regime (which would include intermediate and flexible regimes); within the "more flexible" category, we can then distinguish between regimes with and without a nominal anchor. In other words, this can be viewed as an attempt to classify monetary regimes according to whether they use an exchange rate anchor, a domestic nominal anchor, or no anchor at all. These results are shown in Table G.2: we find evidence that more flexible exchange rate regimes with an anchor are positively linked to economic growth, whereas those without an anchor are negatively linked to growth. We continue to find evidence that pegged exchange rate regimes have a positive effect on growth. In contrast to the results in Table G.1, these results show some evidence of being robust across exchange rate classification schemes.

We also examined the effects of a monetary policy anchor on growth, given that the results in Tables G.1 and G.2 point to the importance of having a nominal anchor in the link between exchange rate regimes and growth. As Table G.3 shows, we find that there is a positive, statistically significant, and robust relationship between the presence of a monetary policy anchor and economic growth. These findings suggest that a strong monetary policy framework has a positive influence on growth.

6. Concluding Remarks

Using a panel-data set of 60 countries over the 1973–98 period, this study found evidence that exchange rate regimes characterized by a monetary policy anchor, whether they are pegged, intermediate, or flexible, exert a positive influence on economic growth. In addition, we find evidence that intermediate/flexible regimes without an anchor are detrimental for growth. Our results thus suggest that it is the presence of a strong monetary policy framework, rather than the type of exchange rate regime per se, that is important for economic growth. Furthermore, our work emphasizes the importance of considering the monetary policy framework that accompanies the exchange rate regime when assessing the macroeconomic performance of alternative exchange rate regimes.

Our findings that a strong monetary policy framework exerts a positive influence on growth are in line with results found in related work on inflation and growth. Indeed, the empirical literature on inflation and growth has found evidence that there is a threshold level above which inflation slows economic growth.[28] For instance, Khan and Senhadji (2001) estimated this threshold level using a dataset covering 140 countries over the 1960–98 period. They found that inflation slowed economic growth above a threshold level of 1 to 3 per cent for industrialized countries and 11 to 12 per cent for developing countries. These findings, together with ours, suggest that good monetary policy promotes growth, and that such a policy can occur under different types of exchange rate regimes.

28. For a recent review of the literature on inflation and growth, see Ghosh (2000).

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Appendix A: List of Countries

(60-country sample)

Argentina
Australia
Austria
Bangladesh
Brazil
C. African Republic
Cameroon
Canada
Chile
China
Colombia
Costa Rica
Cyprus
Denmark
Dominican Republic
Ecuador
Egypt
El Salvador
Finland
France
Gambia
Ghana
Greece
Guatemala
Haiti
Iceland
India
Indonesia
Ireland
Israel
Italy
Japan
Kenya
Korea
Malawi
Malaysia
Malta
Mauritius
Mexico
Nepal
Netherlands
New Zealand
Nicaragua
Niger
Norway
Philippines
Portugal
Senegal
South Africa
Spain
Sri Lanka
Sudan
Sweden
Thailand
Togo
Turkey
United Kingdom
United States
Uruguay
Venezuela

Appendix B: List of Countries by Grouping

(60-country sample)

Western hemisphere:
Argentina
Brazil
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Guatemala
Haiti
Mexico
Nicaragua
Uruguay
Venezuela

Eastern Europe:
Cyprus
Malta
Turkey

Middle East:
Egypt
Israel

Industrialized countries:
Australia
Austria
Canada
Denmark
Finland
France
Greece
Iceland
Ireland
Italy
Japan
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
United Kingdom
United States

East Asia:
Bangladesh
China
India
Indonesia
Korea
Malaysia
Nepal
Philippines
Sri Lanka
Thailand

Africa:
C. African Republic
Cameroon
Gambia
Ghana
Kenya
Malawi
Mauritius
Niger
Senegal
South Africa
Sudan
Togo

Appendix C: Sources and Definitions of Variables

Dependent variable

1. Growth rate of real per-capita GDP over a five-year period (calculated using data on real per-capita GDP taken from the World Bank's *World Development Indicators* (*WDI*)).

Explanatory variables

2. Real per-capita GDP at the beginning of each five-year period (calculated using data on real per-capita GDP taken from the World Bank's *WDI*).
3. Ratio of real investment to real GDP measured in five-year averages (calculated using real investment and real GDP data taken from the World Bank's *WDI*).
4. Average years of secondary schooling of the population aged 25 and over at the beginning of each five-year period (taken from the Barro-Lee data set on educational attainment).
5. Real government share of GDP measured in five-year averages (calculated using real government consumption and real GDP data from the World Bank's *WDI*).
6. Ratio of real (exports plus imports) to real GDP measured in five-year averages (calculated using real export, import, and GDP data from the World Bank's *WDI*).
7. Ratio of money and quasi-money (M2) to GDP measured in five-year averages (taken from the World Bank's *WDI*).
8. Ratio of private sector credit to GDP measured in five-year averages (taken from the World Bank's *WDI*).
9. Ratio of domestic credit provided by banking sector to GDP measured in five-year averages (taken from the World Bank's *WDI*).
10. Ratio of gross private capital flows to GDP measured in five-year average (taken from the World Bank's *WDI*).

Appendix D:
Classification of Exchange Rate/Monetary Regimes

Country	Classification	1973–77	1978–82	1983–87	1988–92	1993–97
Argentina	Official	Peg	Flex (na)	Int (na)	Flex (na)	Peg
	HMR	Peg	Int (na)	Flex (na)	Flex (na)	Peg
Australia	Official	Peg	Peg	Flex (na)	Flex (na)	Flex (a)
	HMR	Peg	Peg	Flex (na)	Int (na)	Int (a)
Austria	Official	Peg	Peg	Peg	Peg	Int (na)
	HMR	Peg	Peg	Peg	Peg	Flex (na)
Bangladesh	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Brazil	Official	Peg	Int (na)	Int (na)	Int (na)	Int (na)
	HMR	Peg	Int (na)	Flex (na)	Flex (na)	Int (na)
Cameroon	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Canada	Official	Flex (na)	Flex (a)	Flex (na)	Flex (na)	Flex (a)
	HMR	Int (na)	Int (a)	Int (na)	Int (na)	Int (a)
Central Africa	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Chile	Official	Peg	Peg	Int (na)	Int (na)	Peg
	HMR	Peg	Peg	Int (na)	Int (na)	Peg
China	Official	Peg	Peg	Peg	Peg	Int (a)
	HMR	Peg	Peg	Peg	Peg	Peg
Colombia	Official	Int (na)	Int (na)	Int (na)	Int (na)	Int (na)
	HMR	Peg	Peg	Peg	Peg	Int (na)
Costa Rica	Official	Peg	Peg	Flex (na)	Flex (na)	Flex (na)
	HMR	Peg	Peg	Int (na)	Int (na)	Peg
Cyprus	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Denmark	Official	Int (na)	Int (na)	Int (na)	Int (na)	Int (na)
	HMR	Int (na)	Flex (na)	Flex (na)	Flex (na)	Flex (na)
Dom. Rep.	Official	Peg	Peg	Int (na)	Peg	Flex (na)
	HMR	Peg	Peg	Int (na)	Peg	Int (na)
Ecuador	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Egypt	Official	Peg	Peg	Peg	Peg	Int (na)
	HMR	Peg	Peg	Peg	Peg	Peg
El Salvador	Official	Peg	Peg	Peg	Int (na)	Flex (na)
	HMR	Peg	Peg	Peg	Peg	Peg
Finland	Official	Peg	Peg	Peg	Peg	Flex (a)
	HMR	Peg	Peg	Peg	Peg	Flex (a)
France	Official	Flex (na)	Int (a)	Int (a)	Int (a)	Int (a)
	HMR	Flex (na)	Flex (a)	Int (a)	Int (a)	Flex (a)
Gambia	Official	Peg	Peg	Flex (na)	Flex (na)	Flex (na)
	HMR	Peg	Peg	Peg	Int (na)	Peg

continued . . .

Appendix D (continued): Classification of Exchange Rate/Monetary Regimes

Country	Classification	1973–77	1978–82	1983–87	1988–92	1993–97
Ghana	Official	Peg	Peg	Int (na)	Flex (na)	Flex (a)
	HMR	Peg	Peg	Flex (na)	Int (na)	Int (a)
Greece	Official	Flex (a)	Flex (a)	Flex (a)	Flex (a)	Flex (a)
	HMR	Int (a)	Int (a)	Int (a)	Int (a)	Int (na)
Guatemala	Official	Peg	Int (na)	Peg	Int (na)	Flex (na)
	HMR	Peg	Peg	Peg	Int (na)	Int (na)
Haiti	Official	Peg	Peg	Peg	Peg	Flex (ND)
	HMR	Peg	Peg	Peg	Peg	Int (ND
Iceland	Official	Int (na)	Int (na)	Int (na)	Peg	Peg
	HMR	Int (na)	Flex (na)	Int (na)	Peg	Peg
India	Official	Peg	Int (na)	Flex (na)	Peg	Flex (a)
	HMR	Peg	Int (na)	Int (na)	Peg	Flex (a)
Indonesia	Official	Peg	Int (na)	Flex (na)	Flex (na)	Flex (na)
	HMR	Peg	Peg	Int (na)	Peg	Peg
Ireland	Official	Peg	Int (na)	Int (na)	Int (na)	Int (na)
	HMR	Peg	Int (na)	Flex (na)	Int (na)	Int (na)
Israel	Official	Peg	Flex (na)	Peg	Peg	Peg
	HMR	Peg	Flex (na)	Peg	Peg	Peg
Italy	Official	Flex (a)	Int (a)	Int (a)	Int (a)	Flex (a)
	HMR	Int (a)	Int (a)	Int (a)	Flex (a)	Flex (na)
Japan	Official	Int (na)	Int (na)	Flex (na)	Flex (na)	Flex (na)
	HMR	Int (na)	Flex (na)	Int (na)	Int (na)	Flex (na)
Kenya	Official	Peg	Peg	Peg	Peg	Flex (na)
	HMR	Peg	Peg	Peg	Peg	Int (na)
Korea	Official	Peg	Flex (a)	Flex (a)	Flex (a)	Flex (a)
	HMR	Peg	Peg	Peg	Peg	Int (a)
Malawi	Official	Peg	Peg	Peg	Peg	Flex (na)
	HMR	Peg	Peg	Peg	Peg	Int (na)
Malaysia	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Malta	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Mauritius	Official	Peg	Peg	Peg	Peg	Flex (na)
	HMR	Peg	Peg	Peg	Peg	Int (na)
Mexico	Official	Peg	Int (na)	Flex (na)	Int (na)	Flex (na)
	HMR	Peg	Peg	Int (na)	Peg	Int (na)
Nepal	Official	Int (na)	Int (na)	Int (na)	Peg	Peg
	HMR	Peg	Int (na)	Int (na)	Peg	Peg
Netherlands	Official	Int (na)	Int (na)	Int (na)	Int (na)	Int (na)
	HMR	Int (na)	Flex (na)	Flex (na)	Flex (na)	Flex (na)
New Zealand	Official	Peg	Peg	Flex (na)	Flex (a)	Flex (a)
	HMR	Peg	Peg	Flex (na)	Int (a)	Int (a)

continued . . .

Appendix D (continued): Classification of Exchange Rate/Monetary Regimes

Country	Classification	1973–77	1978–82	1983–87	1988–92	1993–97
Nicaragua	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Niger	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Norway	Official	Int (na)	Peg	Peg	Peg	Flex (na)
	HMR	Int (na)	Peg	Peg	Peg	Int (na)
Philippines	Official	Flex (na)	Flex (na)	Flex (na)	Flex (na)	Flex (na)
	HMR	Peg	Peg	Int (na)	Peg	Int (na)
Portugal	Official	Int (na)	Flex (na)	Flex (na)	Flex (na)	Int (na)
	HMR	Int (na)	Int (na)	Int (na)	Int (na)	Int (na)
Senegal	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
South Africa	Official	Peg	Int (na)	Flex (na)	Flex (a)	Flex (a)
	HMR	Peg	Flex (na)	Int (na)	Int (a)	Int (a)
Spain	Official	Peg	Int (a)	Flex (a)	Int (a)	Int (a)
	HMR	Peg	Int (a)	Int (a)	Flex (a)	Flex (na)
Sri Lanka	Official	Peg	Int (na)	Flex (na)	Flex (na)	Flex (na)
	HMR	Peg	Int (na)	Peg	Peg	Peg
Sudan	Official	Peg	Peg	Peg	Peg	Flex (ND)
	HMR	Peg	Peg	Peg	Peg	Int (ND)
Sweden	Official	Int (a)	Peg	Peg	Peg	Flex (a)
	HMR	Int (a)	Peg	Peg	Peg	Flex (a)
Thailand	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Togo	Official	Peg	Peg	Peg	Peg	Peg
	HMR	Peg	Peg	Peg	Peg	Peg
Turkey	Official	Int (na)	Int (na)	Int (na)	Flex (a)	Flex (na)
	HMR	Int (na)	Flex (na)	Flex (na)	Flex (a)	Int (na)
United Kingdom	Official	Flex (na)	Flex (a)	Flex (a)	Flex (a)	Flex (a)
	HMR	Int (na)	Int (a)	Int (a)	Flex (a)	Int (a)
United States	Official	Flex (a)	Flex (a)	Flex (a)	Flex (a)	Flex (na)
	HMR	Flex (a)	Int (a)	Flex (a)	Flex (a)	Flex (na)
Uruguay	Official	Int (na)	Int (na)	Int (na)	Flex (na)	Flex (na)
	HMR	Int (na)	Int (na)	Int (na)	Int (na)	Int (na)
Venezuela	Official	Peg	Peg	Peg	Flex (na)	Int (na)
	HMR	Peg	Peg	Peg	Int (na)	Int (na)

Notes:

(1) For each country, the first line depicts the exchange rate regime according to the official classification, and the second line according to the HMR. A shaded cell indicates a disparity between the two.

(2) Exchange rate regimes are classified as follows: pegged (Peg), flexible (Flex), or intermediate (Int).

(3) The monetary policy framework is classified as either having a nominal anchor (a) or having no nominal anchor (na). By definition, all fixed exchange rate regimes are classified as having a nominal anchor.

(4) ND indicates that no data were available.

Appendix E: Exchange Rate Regimes by Classification

Appendix F: Descriptive Statistics

Table F.1
Descriptive Statistics for Full Sample

Variable	Mean	Standard deviation	Minimum	Maximum
Growth rate of real per-capita GDP	0.0178	0.0267	-0.0734	0.1194
Initial real per-capita GDP	7.9799	1.6128	4.9806	10.6064
Average years of schooling	1.3883	1.0552	0.0200	4.9300
Investment/GDP	0.2223	0.0613	0.0510	0.4111
Gov't consumption/GDP	0.1473	0.0578	0.0247	0.4027
Trade/GDP	0.5904	0.3103	0.1104	1.9436
Private credit/GDP	0.4159	0.2927	0.0250	1.8233
Commercial bank	0.7526	0.1843	0.2229	0.9990
Bank assets/GDP	0.4570	0.2977	0.0503	1.5110
Gross capital flows/GDP	0.0696	0.0855	0.0005	0.6526
CPI inflation	0.3209	1.2082	-0.0346	12.7840
Population growth	0.0169	0.0101	-0.0089	0.0445

Notes:
(1) Based on five-year averages for the 1973–98 period.
(2) In percentage points, except for dummy variables.
(3) For variable definitions and sources, see Appendix C.

Table F.2
Selected Variable Means by Type of Exchange Rate Regime

Official classification	Pegged (130 obs.)	Intermediate (65 obs.)	Flexible (83 obs.)	All regimes (278 obs.)
Growth rate	0.0143	0.0217	0.0202	0.0178
Initial real per-capita GDP	7.3894	8.5716	8.4414	7.9799
Average years of schooling	1.0135	1.5102	1.8798	1.3883
Investment/GDP	0.2230	0.2176	0.2250	0.2223
Gov't consumption/GDP	0.1503	0.1425	0.1464	0.1473
Trade/GDP	0.6579	0.5327	0.5300	0.5904
Gross capital flows/GDP	0.0544	0.0896	0.0777	0.0696
Private credit/GDP	0.3601	0.4469	0.4790	0.4159
Inflation	0.1959	0.5755	0.3171	0.3209

Table F.3
Selected Variable Means by Type of Monetary Arrangement

Official classification	Monetary policy anchor (174 obs.)	No monetary policy anchor (104 obs.)	All arrangements (278 obs.)
Growth rate	0.0165	0.0200	0.0178
Initial real per-capita GDP	7.8449	8.2057	7.9799
Average years of schooling	1.3375	1.4731	1.3883
Investment/GDP	0.2231	0.2209	0.2223
Gov't consumption/GDP	0.1543	0.1356	0.1473
Trade/GDP	0.6078	0.5613	0.5904
Gross capital flows/GDP	0.0684	0.0717	0.0696
Private credit/GDP	0.4215	0.4067	0.4159
Inflation	0.1730	0.5684	0.3209

Table F.4
Selected Variable Means by Type of Exchange Rate Regime and Monetary Arrangement

Official classification	Pegged (130 obs.)	Intermediate (65 obs.)		Flexible (83 obs.)		All regimes (278 obs.)
		Monetary policy anchor (12 obs.)	No monetary policy anchor (53 obs.)	Monetary policy anchor (32 obs.)	No monetary policy anchor (51 obs.)	
Growth rate	0.0143	0.0235	0.0213	0.0225	0.0188	0.0178
Initial real per-capita GDP	7.3894	9.3153	8.4032	9.1442	8.0004	7.9799
Average years of schooling	1.0135	2.0267	1.3933	2.3956	1.5561	1.3883
Investment/GDP	0.2230	0.2338	0.2139	0.2198	0.2282	0.2223
Gov't consumption/GDP	0.1503	0.1739	0.1353	0.1631	0.1359	0.1473
Trade/GDP	0.6579	0.4382	0.5541	0.4681	0.5688	0.5904
Gross capital flows/GDP	0.0544	0.0904	0.0894	0.1166	0.0533	0.0696
Private credit/GDP	0.3601	0.6990	0.3898	0.5665	0.4240	0.4159
Inflation	0.1959	0.0899	0.6855	0.1108	0.4466	0.3209

Table F.5
Selected Variable Means by Type of Exchange Rate Regime

HMR classification	Pegged (157 obs.)	Intermediate (82 obs.)	Flexible (39 obs.)	All regimes (278 obs.)
Growth rate	0.0165	0.0192	0.0199	0.0178
Initial real per-capita GDP	7.3345	8.5258	9.4304	7.9799
Average years of schooling	1.0386	1.6521	2.2410	1.3883
Investment/GDP	0.2261	0.2223	0.2073	0.2223
Gov't consumption/GDP	0.1430	0.1449	0.1696	0.1473
Trade/GDP	0.6381	0.5370	0.5107	0.5904
Gross capital flows/GDP	0.0490	0.0816	0.1275	0.0696
Private credit/GDP	0.3472	0.4698	0.5790	0.4159
Inflation	0.1886	0.3017	0.8938	0.3209

Table F.6
Selected Variable Means by Type of Monetary Arrangement

HMR classification	Monetary policy anchor (190 obs.)	No monetary policy anchor (88 obs.)	All arrangements (278 obs.)
Growth rate	0.0166	0.0203	0.0178
Initial real per-capita GDP	7.6728	8.6429	7.9799
Average years of schooling	1.2576	1.6703	1.3883
Investment/GDP	0.2241	0.2184	0.2223
Gov't consumption/GDP	0.1475	0.1468	0.1473
Trade/GDP	0.6033	0.5626	0.5904
Gross capital flows/GDP	0.0604	0.0896	0.0696
Private credit/GDP	0.3910	0.4696	0.4159
Inflation	0.1753	0.6353	0.3209

Table F.7
Selected Variable Means by Type of Exchange Rate Regime and Monetary Arrangement

HMR classification	Pegged (157 obs.)	Intermediate (82 obs.)		Flexible (39 obs.)		All regimes (278 obs.)
		Monetary policy anchor (23 obs.)	No monetary policy anchor (59 obs.)	Monetary policy anchor (10 obs.)	No monetary policy anchor (29 obs.)	
Growth rate	0.0165	0.0160	0.0205	0.0197	0.0200	0.0178
Initial real per-capita GDP	7.3345	9.2894	8.2282	9.2672	9.4866	7.9799
Average years of schooling	1.0386	2.1574	1.4552	2.6270	2.1079	1.3883
Investment/GDP	0.2261	0.2197	0.2233	0.2039	0.2084	0.2223
Gov't consumption/GDP	0.1430	0.1671	0.1362	0.1729	0.1684	0.1473
Trade/GDP	0.6381	0.4737	0.5617	0.3546	0.5645	0.5904
Gross capital flows/GDP	0.0490	0.1052	0.0724	0.1359	0.1246	0.0696
Private credit/GDP	0.3472	0.5846	0.4251	0.6338	0.5601	0.4159
Inflation	0.1886	0.1073	0.3775	0.1227	1.1598	0.3209

Appendix G: Estimation Results

Table G.1

Dependent Variable: Growth Rate of Real Per-Capita GDP
GMM Estimates for 60-Country Sample over 1973–98

ER regime classification	OC	HMR	HMR	OC	HMR	HMR
Initial real per-capita GDP	-0.0707*** (0.000)	-0.0964*** (0.000)	-0.1078*** (0.000)	-0.0898*** (0.000)	-0.1037*** (0.000)	-0.0977*** (0.000)
Average years of schooling	0.0169*** (0.000)	0.0185*** (0.000)	0.0242*** (0.000)	0.0209*** (0.000)	0.0229*** (0.000)	0.0236*** (0.000)
Investment/GDP	0.0141 (0.534)	-0.0544** (0.041)	-0.0242 (0.296)	-0.0478 (0.180)	-0.0054 (0.886)	-0.0426 (0.189)
Gov't consumption/GDP	-0.0873*** (0.005)	-0.0670* (0.081)	-0.0790*** (0.019)	-0.0955*** (0.006)	-0.1124*** (0.001)	-0.0761*** (0.007)
Trade/GDP	0.0619*** (0.000)	0.1204*** (0.000)	0.1243*** (0.000)	0.0957*** (0.000)	0.1083*** (0.000)	0.1188*** (0.000)
Private credit /GDP	-0.0162** (0.033)	-0.0038 (0.554)	0.0115* (0.108)	0.0001 (0.994)	0.0118 (0.264)	0.0029 (0.728)
Gross capital flows/GDP	0.1049*** (0.000)	0.0820*** (0.000)	0.0623*** (0.001)	0.0555*** (0.003)	0.0541** (0.022)	0.0882*** (0.000)
Flexible ER regime	-0.0022 (0.396)	-0.0038** (0.058)				
Intermediate ER regime	-0.0007 (0.768)	-0.0108*** (0.000)	-0.0061*** (0.002)			
Pegged ER regime			0.0069*** (0.003)			0.0051** (0.038)
Intermediate ER regime + anchor				0.0059 (0.396)	-0.0046 (0.432)	-0.0016 (0.582)
Intermediate ER regime + no anchor				0.0007 (0.863)	-0.0119*** (0.000)	-0.0077*** (0.001)
Flexible ER regime + anchor				0.0006 (0.900)	-0.0024 (0.644)	0.0021 (0.595)
Flexible ER regime + no anchor				0.0001 (0.963)	0.0027 (0.456)	
Number of observations	218	218	218	218	218	218
Sargan test (*p*-value)	0.748	0.753	0.922	0.595	0.653	0.620
Diff.-Sargan test (*p*-value)	0.825	0.831	0.908	0.924	0.796	0.745

Notes:
(1) OC stands for official classification and HMR stands for hybrid mechanical rule.
(2) The figures in parentheses are *p*-values.
(3) (***), (**), and (*) indicate statistical significance at the 1, 5, and 10 per cent levels, respectively.
(4) Period dummies and a constant are included in each regression.
(5) All the statistically significant results in this table are robust to specification changes.

Table G.2

Dependent Variable: Growth Rate of Real Per-Capita GDP
GMM Estimates for 60-Country Sample over 1973–98

ER regime classification	OC	HMR	OC	HMR
Initial real per-capita GDP	-0.1009***	-0.0801***	-0.1030***	-0.0948***
	(0.000)	(0.000)	(0.000)	(0.000)
Average years of schooling	0.0204***	0.0227***	0.0222***	0.0242***
	(0.000)	(0.000)	(0.000)	(0.000)
Investment/GDP	-0.0174	-0.0471*	-0.0132	-0.0401
	(0.447)	(0.089)	(0.574)	(0.159)
Gov't consumption/GDP	-0.1405***	-0.1334***	-0.1652***	-0.1314***
	(0.001)	(0.000)	(0.000)	(0.000)
Trade/GDP	0.0690***	0.0892***	0.0744***	0.1052***
	(0.000)	(0.000)	(0.000)	(0.000)
Private credit/GDP	-0.0064	-0.0186***	-0.0040	-0.0133***
	(0.384)	(0.000)	(0.570)	(0.016)
Gross capital flows/GDP	0.1265***	0.1236***	0.1177***	0.1334***
	(0.000)	(0.000)	(0.000)	(0.000)
Flex. and int. with anchor	0.0124***	-0.0026	0.0145***	0.0080***
	(0.001)	(0.377)	(0.000)	(0.001)
Flex. and int. no anchor	-0.0022	-0.0100***		
	(0.183)	(0.000)		
Pegged ER regime			0.0037**	0.0131***
			(0.059)	(0.000)
Number of observations	218	218	218	218
Sargan test (*p*-value)	0.840	0.874	0.839	0.859
Diff.-Sargan test (*p*-value)	0.641	0.555	0.683	0.607

Notes:
(1) See notes (1) through (4) for Table G.1.
(2) All the statistically significant results in this table are robust to specification changes.

Table G.3

Dependent Variable: Growth Rate of Real Per-Capita GDP
GMM Estimates for 60-Country Sample over 1973–98

ER regime classification	OC	HMR
Initial real per-capita GDP	-0.0966***	-0.0802***
	(0.000)	(0.000)
Average years of schooling	0.0215***	0.0200***
	(0.000)	(0.000)
Investment/GDP	-0.0072	-0.0514**
	(0.816)	(0.037)
Gov't consumption/GDP	-0.1388***	-0.0921***
	(0.000)	(0.000)
Trade/GDP	0.0886***	0.0949***
	(0.000)	(0.000)
Private credit /GDP	-0.0106	-0.0141***
	(0.121)	(0.005)
Gross capital flows/GDP	0.1288***	0.1118***
	(0.000)	(0.000)
Monetary policy anchor	0.0040***	0.0076***
	(0.008)	(0.000)
Number of observations	218	218
Sargan test (*p*-value)	0.581	0.582
Diff.-Sargan test (*p*-value)	0.878	0.633

Notes:
(1) See notes (1) through (4) for Table G.1.
(2) All the statistically significant results in this table are robust to specification changes.

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